

CS4285: HIGH SPEED MULTIMEDIA NETWORKS

Effective Term

Semester A 2022/23

Part I Course Overview

Course Title

High Speed Multimedia Networks

Subject Code

CS - Computer Science

Course Number

4285

Academic Unit

Computer Science (CS)

College/School

College of Engineering (EG)

Course Duration

One Semester

Credit Units

3

Level

B1, B2, B3, B4 - Bachelor's Degree

Medium of Instruction

English

Medium of Assessment

English

Prerequisites

CS3201 Computer Networks or EE3009 Data Communication Protocols or (EE3015 Computer Networks and EE2371 Data Communication Laboratory)

Precursors

Nil

Equivalent Courses

Nil

Exclusive Courses

Nil

Part II Course Details

Abstract

The course aims to provide an up-to-date knowledge of high-speed networks to students. The course covers basic concepts, architectures, protocols, advantages and limitations, and recent development of various high-speed networking technologies; and how the various networks cope with multimedia data transmission and some multimedia applications in both wired and wireless environments. The current and future developments in high-speed networks are discussed. Multimedia applications such as Video on Demand, and multimedia streaming are also discussed.

Course Intended Learning Outcomes (CILOs)

CILOs		Weighting (if app.)	DEC-A1	DEC-A2	DEC-A3
1	Understand the design of high-speed LAN and link layer to support multimedia and real-time traffic and applications.	20	x	x	
2	Understand the quality of service (QoS) parameters for multimedia traffic and the various trade-off.	20	x	x	
3	Evaluate the network technologies for satisfying particular QOS requirements.	10	x	x	
4	Understand the mechanisms to admission control and congestion control.	10	x	x	
5	Understand the mechanism/protocol to conduct the multimedia streaming in high speed wired and wireless networks.	20	x	x	
6	Illustrate the Integrated services and differentiated services in related to QoS communications.	20	x	x	

A1: Attitude

Develop an attitude of discovery/innovation/creativity, as demonstrated by students possessing a strong sense of curiosity, asking questions actively, challenging assumptions or engaging in inquiry together with teachers.

A2: Ability

Develop the ability/skill needed to discover/innovate/create, as demonstrated by students possessing critical thinking skills to assess ideas, acquiring research skills, synthesizing knowledge across disciplines or applying academic knowledge to real-life problems.

A3: Accomplishments

Demonstrate accomplishment of discovery/innovation/creativity through producing /constructing creative works/new artefacts, effective solutions to real-life problems or new processes.

Teaching and Learning Activities (TLAs)

TLAs	Brief Description	CILO No.	Hours/week (if applicable)	
1	Lecture	Explain the basic concepts of various technologies to better support multimedia streaming.	1, 2, 3, 4, 5, 6	3 hours/week

2	Tutorial	Show how to apply the knowledge learned in lectures to solve problems.	1, 2, 3, 4, 5, 6	8 hours/semester
3	Homework	Test students' understanding on the knowledge learned in lectures and train the students with independent thinking.	1, 2, 3, 4, 5, 6	0.5
4	Group project	Allow students to create practical and innovative voice over IP application using the real-time streaming protocols learned in lectures.	2, 3, 5	0.5

Assessment Tasks / Activities (ATs)

	ATs	CILO No.	Weighting (%)	Remarks (e.g. Parameter for GenAI use)
1	Homework	1, 2, 3, 4, 5, 6	5	
2	Quiz	1, 2, 3, 4, 5, 6	15	
3	Group project	2, 3, 5	10	

Continuous Assessment (%)

30

Examination (%)

70

Examination Duration (Hours)

2

Additional Information for ATs

For a student to pass the course, at least 30% of the maximum mark for the examination must be obtained.

Assessment Rubrics (AR)**Assessment Task**

Homework

Criterion

The ability to solve problems using the knowledge learned in lectures

Excellent (A+, A, A-)

High

Good (B+, B, B-)

Significant

Fair (C+, C, C-)

Moderate

Marginal (D)

Basic

Failure (F)

Not even reaching marginal levels

Assessment Task

Quiz & Final Exam

Criterion

The ability to solve problems using the knowledge learned in lectures

Excellent (A+, A, A-)

High

Good (B+, B, B-)

Significant

Fair (C+, C, C-)

Moderate

Marginal (D)

Basic

Failure (F)

Not even reaching marginal levels

Assessment Task

Group presentation

Criterion

The ability to innovatively create real-time streaming applications

Excellent (A+, A, A-)

High

Good (B+, B, B-)

Significant

Fair (C+, C, C-)

Moderate

Marginal (D)

Basic

Failure (F)

Not even reaching marginal levels

Part III Other Information

Keyword Syllabus

Fundamentals of high speed network architectures and protocols, Link-layer addressing, Inter-networking, Multimedia communications, Quality of Services, Integrated and differentiated services, Resource allocation and traffic control, Dynamic routing protocols, Audio and video media transport in packet networks, Multimedia transmission in wired and wireless networks.

Syllabus

An architecture and paradigm of various high speed networks will be presented during the lectures, with discussion of the following issues and the related techniques/algorithms:

- 1. Basic issues of concepts of high speed networks: characteristics, ATM and high speed LAN.
- Congestion and traffic management: the concepts and techniques in general, multiple access control.
- Multimedia networking: streaming audio and video.
- Protocols for interactive streaming for both audio and video.

Reading List

Compulsory Readings

Title	
1	Nil

Additional Readings

Title	
1	James F. Kurose and Keith W. Ross (2005). Computer Networking, Top-down approach featuring the internet. Addison Wesley, 3rd edition.
2	William Stallings (2002). High-Speed Networks and Internets: Performance and Quality of Service, 2/E. Prentice Hall.